

Electricity & Circuits

Teacher Lesson Plan



Background Information

Electricity is moving electrons.

- Atoms are the building blocks of the universe. Electrons are tiny particles found in atoms.
- The center of an atom is called the nucleus, made of particles called protons and neutrons.
- Electrons are constantly spinning and moving in shells around the nucleus.

Circuits

- Electrons flowing through a wire make a complete path, called a circuit.
- Our electric grid produces alternating current (AC).
- A battery produces electricity – moving electrons – only when it is part of a circuit.
- A battery produces direct current (DC).
- When a switch is open no electricity flows or makes a complete path.
- Different materials are “conductors” of electricity. Silver is the best electricity conductor, but it isn’t widely used due to its cost. Copper is the metal used in most homes’ electrical systems.
- Some materials do not conduct electricity or resist the flow of electricity. These are called insulators.

Student Activities

LESSON 1: Open & Closed Circuits

- Materials-Energy Batons
- Form a circle and hold the wrist or touch fingers of the students beside you. Students need to be touching skin, not clothes. Two people will hold the metal electrodes on the ends of the Energy Baton.
- The baton will light up and make a sound when everyone is touching. This represents a **closed circuit** - everyone is touching which allows a pathway for the electrons to flow.
- Two people release their hands – This represents a **switch**. The Baton will not light up or make sounds. This is an **open circuit**.

LESSON 2: Electricity Conductors and Insulators

- Materials: Energy Batons, Samples of Insulations & Conductors
- Student Worksheet: Electricity Insulators & Conductors

- Repeat the exercise above, but now add in samples of insulators and conductors. Have two students opposite of the Baton each hold one end of one of the insulator/conductor samples.
- If the material is a conductor of electricity, it will complete the circuit and the bulb will light.
- If the material is an insulator, it will not close the circuit and the Baton will not light up.
- Discuss that metals are the best conductors of electricity. Water also conducts electricity.
- Conductors and insulators are topics in both electricity and thermal energy. Conductors always allow energy to transfer easily. Insulators always resist the transfer of energy. However, the materials for electric and thermal energy conductors and insulators may vary.

Answers to Student Worksheet:

Electricity Conductors: metal spoon, aluminum foil, paper clip, water

Electricity Insulators: straw, plastic spoon, paper, chopstick, glass, fabric, rubber tire

LESSON 3: Series & Parallel Circuits

- Materials: Snap Circuit Sets
- See separate series and parallel circuit instruction page.

LESSON 4: Snap Circuits

- Materials: Energy Batons, large open space
- Use the Snap Circuit sets to discuss open/closed circuits and that electricity can be transformed into light, sound, motion and heat. Series and Parallel circuits can also be discussed.
- The Project Guide in each kit provides the directions for each circuit.